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**Original Article**

# Studying the Relationship between Dental Caries Index and Quality of Life Related to Oral Health

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## ABSTRACT

Sexuality, which plays an essential and significant role in human life, is provided through healthy sexual organs. Therefore, any disease in the genital area, including vaginitis, can interfere with these tendencies and thus affect the quality of life of the individual. The researchers, therefore, conducted a study aimed at comparing sexual satisfaction in pregnant women with vaginal candidiasis. This is a cross-sectional study to evaluate the effect of Candida vaginitis infection on sexual satisfaction that should be considered in healthy individuals and comparative work. Therefore, in this study, 160 pregnant mothers referred to the gynecology clinic, Shahid Beheshti Hospital, Tehran were selected by convenience sampling method and divided into two groups of healthy pregnant women and vaginal candidiasis women (each group 80 people). Data were collected using the Larson Sexual Satisfaction Questionnaire. After data collection, data were analyzed in SPSS software and analyzed by independent t-test. The results showed that sexual satisfaction in healthy pregnant women was slightly higher than pregnant women with vaginal candidiasis, and there was a significant difference between the two groups regarding sexual satisfaction ($p < 0.05$). These results suggest that there is a relationship between sexual satisfaction and Candida infection. Regarding the difference of sexual satisfaction in the group of pregnant women with vaginal candidiasis and healthy pregnant women, it can be concluded that the rate of sexual satisfaction with the vaginal candidate will be effected and makes problems and disorders.

**Keywords:** Sexual satisfaction, Pregnant mothers, Healthy mothers, Candidate vaginitis

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## Introduction

Dental caries is one of the most important oral health problems in industrialized and developing countries, affecting 60-90% of primary school children and adults. Dental caries is an infectious disease caused by acid-producing bacteria, Streptococcus mutans and lactobacilli. Once cavities develop, this decay is irreversible [1-3].

Dental caries have a significant impact on various aspects of daily life. Many dental caries are caused by poor hygiene and, if not treated promptly and appropriately, can lead to infections in the body, especially in the oral tissues, sinuses, and heart, posing serious risks to the health and life of the individual [4-6]. With proper oral hygiene education and regular dental check-ups, most caries can be prevented, thereby reducing the heavy financial and psychological costs to the individual and society [7, 8].

Dental caries can be affected by several sociodemographic factors; therefore, in this regard, calculating a valid dental caries index, known in dentistry as the DMFT Index, can provide a general picture of the individual and society, based on which preventive and therapeutic strategies can be planned

and implemented [9-11]. On the other hand, the role of teeth in other aspects of an individual's satisfaction with daily life cannot be denied [12-14]. The aesthetic appearance of teeth, a beautiful smile, and their role in social relationships, a sense of comfort in the mouth, the absence of pain in the jaw and teeth, pleasure and comfort when eating, and speaking can be affected by dental caries and reduce an individual's overall satisfaction with life and quality of life [15, 16].

According to the definition of the World Health Organization (WHO), quality of life includes people's perception of their position in life, taking into account their goals, expectations, standards, and priorities based on the cultural context and value system in which they live [17-19]. This study was conducted to determine the relationship between the index of dental caries and oral health-related quality of life.

## Materials and Methods

This descriptive-analytic study was done on 61 patients (29 men and 32 women) with an age range of 20-50 years and a mean age of 33.98 ± 8.63 years.

The inclusion criteria included the age range of 20 to 50 years, willingness to participate in the study, and sufficient cognitive ability and understanding to respond to the questionnaire. The exclusion criteria included pregnancy in women, the presence of any systemic disease, orthodontics or a history of orthodontic treatment, and the presence of obvious psychological disorders. Oral examinations were performed by a dentist specializing in oral, and maxillofacial diseases. Using the results of the pilot study (correlation rate of 0.471) and considering a test power of 95%, using the correlation test approach in G-Power software, the sample size was determined as 52 people. Considering a 20% probability of loss, the sample size was considered to be 65 people.

The age range of the participants was divided into three age groups: 20 to less than 30 years, 30 to less than 40 years, and 40 to 50 years. The DMFT index, including missing teeth, decay, and fillings, was determined for each subject. Teeth that were lost or extracted for reasons other than decay, such as orthodontic treatment or trauma, as well as teeth with genetic defects in enamel or dentin, and wisdom teeth were not included in the DMFT calculation.

The Dental Impact on Daily Living questionnaire, which is related to oral health, was used to determine quality of life. This questionnaire evaluates five domains in 36 questions, including oral comfort, appearance and aesthetics, eating restrictions, general oral and dental function, and tooth and jaw joint pain [20]. To further ensure the validity and reliability of the instrument, this questionnaire was also reviewed and approved by two expert professors from the School of Dentistry. To assess reliability, the questionnaire was completed by 20 patients who visited the School of Dentistry and was completed again by the same patients after 2 weeks. Cronbach's alpha coefficient was 0.892, which was greater than 0.7, indicating the reliability of the questionnaire.

After providing the necessary explanations, participants were asked to carefully complete the DIDL questionnaire. To resolve ambiguity in answering some questions, clarifying explanations were provided according to the implementation guide, and the DIDL questionnaire was completed under the supervision of an oral, maxillofacial, and facial specialist. DIDL scores were entered based on the responses based on positivity (+1), neutrality (0), and negativity (-1). Then, items within a dimension were summed and divided by several dimension items, and a score was obtained for each category. To create a single total score, weighted dimension scores were summed and calculated. Then, dimension weights were combined with dimension scores to obtain the final total score. The individual total score ranged from 10 to -10. Then, DIDL questionnaire responses were grouped into three categories: dissatisfied (scores below zero), fairly satisfied (scores 0-7), and satisfied (scores above 7) [20].

Data were analyzed using SPSS-23 software. Quantitative data were described by means and standard deviation, and qualitative data were described by classification and relative frequency calculation. The normality of the questionnaire scores was examined and confirmed by the Shapiro-Wilk test. Correlation tests, linear regression, analysis of variance, and chi-square approaches were used to examine the research hypotheses. The correlation test approach was used to determine the relationship between DMFT and the quality of life of the clients. The significance level of all tests was considered less than 0.05.

## Results and Discussion

The mean and standard deviation of the oral health-related quality of life score for all subjects (including a factor of 10 to equalize scores) was calculated to be 5.14 ± 0.229, which indicated the level of relative satisfaction with quality of life. The frequency distribution of satisfaction in the five dimensions of the DIDL questionnaire is shown in **Table 1**. The percentage of patient satisfaction was determined as 31.14% dissatisfied, 57.37% relatively satisfied, and 11.47% satisfied according to the total score of the five

quality of life domains. Patient satisfaction was determined as dissatisfied in the appearance and beauty domain (45.90%) and relatively satisfied in the domains of oral comfort (63.93%), overall oral and dental function (52.45%), eating restrictions (45.90%), and tooth and jaw joint pain (39.34%) **(Table 1)**.

**Table 1.** Frequency distribution of satisfaction in five domains of quality of life-based on the Dental Impact on Daily Living DIDL questionnaire

| Satisfaction level | Appearance and beauty N (%) | Oral comfort N (%) | Overall oral and dental function N (%) | Eating restrictions N (%) | Tooth and jaw pain N (%) | Total questionnaire N (%) |
|---|---|---|---|---|---|---|
| Dissatisfied | 28 (45.90%) | 15 (24.59%) | 15 (24.59%) | 15 (24.59%) | 21 (34.42%) | 19 (31.14%) |
| Relatively satisfied | 18 (29.50%) | 39 (63.93%) | 32 (52.45%) | 28 (45.90%) | 24 (39.34%) | 35 (57.37%) |
| Satisfied | 15 (24.59%) | 7 (11.47%) | 14 (22.95%) | 18 (29.50%) | 16 (26.22%) | 7 (11.47%) |
| Total | 61 (100%) | 61 (100%) | 61 (100%) | 61 (100%) | 61 (100%) | 61 (100%) |

The mean and standard deviation of DMFT in the range of 0-28 was 9.36 ± 5.14 with the highest frequency of values 7, 11, and 13, each comprising 11.5% of the sample size. The mean and standard deviation of caries (D) in the range of 0-12 was 3.44 ± 3.15, the mean and standard deviation of tooth loss (M) in the range of 0-19 was 2.92 ± 1.98, and the mean and standard deviation of tooth filling (F) in the range of 0-13 was 3.93 ± 3.63.

23 people (37.7%) were in the age group of 20-30 years, 24 people (39.3%) were in the age group of 30-40 years, and 14 people (23%) were in the age group of 50-40 years. The level of education of 6 people (9.8%) was primary, 23 people (37.7%) had high school diplomas, and 32 people (52.5%) were university graduates.

There was a moderately significant inverse relationship between quality of life and DMFT (level of satisfaction) related to oral health (P = 0.005, Pearson correlation coefficient = -0.358). By controlling for the effect of gender, the correlation coefficient between quality of life and DMFT was calculated to be -0.357, and gender played a significant role in this relationship (P = 0.005). By controlling for the effect of age, the correlation coefficient between quality of life and DMFT was calculated to be -0.309, and age played a significant role in this relationship (P = 0.016). By controlling for the effect of education level, the correlation coefficient between quality of life and DMFT was calculated to be -0.339, and education level also played a significant role in this relationship (P = 0.008).

Two approaches were used to determine the relationship between DMFT and quality of life by gender. Using the correlation test, the relationship between DMFT and quality of life was calculated separately in men and women. The Pearson correlation coefficient in men was determined to be -0.444, which was a moderate, inverse, and significant relationship (P= 0.016). Pearson correlation coefficient in women was determined to be -0.245, which was a weak, inverse, and non-significant relationship. Using linear regression and considering DMFT and gender as predictor variables and quality of life as the response variable, the model explanation rate (Adjusted R Square= 0.14) was obtained. According to the results of multiple linear regression, the DMFT variable had a significant effect on the quality of life variable (P= 0.005); but the gender variable was not significant.

Two approaches were used to determine the relationship between DMFT and quality of life by age. Using the correlation test, the relationship between DMFT and quality of life was calculated separately in age groups. The Pearson correlation coefficient in the 20-30 age group was determined to be -0.233, which was weak, inverse, and non-significant. The Pearson correlation coefficient in the 30-40 age group was calculated as -0.441, which was moderate, inverse, and significant (P= 0.031), and in the 40-50 age group, it was also calculated as -0.385, which was moderate, inverse, and non-significant. Using linear regression, considering DMFT and age as predictor variables and quality of life as the response variable, the model explanation rate (Adjusted R Square= 0.10) was obtained. According to the results of multiple linear regression, the DMFT variable was significant on the quality of life variable (P = 0.016); but the age variable was not significant.

Two approaches were also used to determine the relationship between DMFT and quality of life according to the level of education. Using the correlation test, the relationship between DMFT and quality of life was calculated separately in people with different levels of education. The Pearson correlation coefficient in the group with primary education was determined as -0.625, which was strong, inverse, and non-significant. The Pearson correlation coefficient in the group with a diploma was calculated as -0.389,

which was moderate, inverse, and insignificant. The Pearson correlation coefficient in the group with university education was determined as -0.192, which was weak, inverse, and insignificant. Using linear regression, considering DMFT and education level as predictor variables and quality of life as the response variable, the model explanation rate (Adjusted R Square = 0.11) was obtained **(Table 2)**. According to the results of multiple linear regression, the DMFT variable had a significant effect on the quality of life variable (P = 0.008); but the education level variable was not significant.

**Table 2.** Multiple regression of the relationship between DMFT and quality of life

| Variables | | Variable coefficient (β) | Standardized coefficient of the variable | t-statistic | P-value |
|---|---|---|---|---|---|
| Age | Model constant | 0.538 | - | 2.588 | 0.012 |
| | Age | -0.001 | -0.028 | -0.204 | 0.839 |
| | DMFT | -0.028 | -0.345 | -2.477 | 0.016 |
| Gender | Model constant | 0.753 | - | 4.185 | < 0.001 |
| | Gender | -0.170 | -0.205 | -1.708 | 0.093 |
| | DMFT | -0.028 | -0.348 | -2.908 | 0.005 |
| Education level | Model constant | 0.314 | - | 1.373 | 0.175 |
| | Education level | 0.071 | 0.114 | 0.925 | 0.359 |
| | DMFT | -0.028 | -0.339 | -2.741 | 0.008 |

The relationship between the components of the DMFT index and quality of life (individual satisfaction level) was evaluated. There was a weak, inverse, and significant relationship between dental caries (D) and quality of life (P=0.048, Pearson correlation coefficient=-0.254). There was also a moderate, inverse, and significant relationship between tooth loss (M) and quality of life (P = 0.003, Pearson correlation coefficient=-0.377). According to the correlation coefficient of +0.018, there was a weak and direct relationship between tooth filling (F) and quality of life; but it was not significant.

To compare the quality of life (satisfaction level) in each of the five dimensions of the questionnaire according to gender and age, the frequency of individuals was calculated and the nonparametric chi-square test was used for comparison. The frequency distribution of the satisfaction levels of individuals in the five dimensions according to gender and age is shown in **Table 3**.



**Table 3.** Frequency distribution of satisfaction levels in areas of quality of life-related to oral health based on the Dental Impact on Daily Lining (DIDL) questionnaire by gender and age group

| Quality of life domain | Satisfaction rate by questionnaire dimensions | Gender | | Age group (Years) | | |
|---|---|---|---|---|---|---|
| | | Male N (%) | Female N (%) | 20-30 N (%) | 30-40 N (%) | 40-50 N (%) |
| Appearance and aesthetics | Dissatisfied | 15 (53.6) | 13 (46.4) | 9 (32.1) | 11 (39.3) | 8 (28.6) |
| | Relatively satisfied | 9 (50) | 9 (50) | 8 (44.4) | 6 (33.3) | 4 (22.2) |
| | Satisfied | 5 (33.3) | 10 (66.7) | 6 (40) | 7 (46.7) | 2 (13.3) |
| Oral comfort | Dissatisfied | 5 (33.3) | 10 (66.7) | 6 (40) | 4 (26.7) | 5 (33.3) |
| | Relatively satisfied | 18 (46.2) | 21 (53.8) | 12 (30.8) | 20 (51.3) | 7 (17.9) |
| | Satisfied | 6 (85.7) | 1 (14.3) | 5 (71.4) | 0 (0) | 2 (28.6) |
| Overall oral and dental function | Dissatisfied | 5 (33.3) | 10 (66.7) | 3 (20) | 8 (53.3) | 4 (26.7) |
| | Relatively satisfied | 14 (43.8) | 18 (56.2) | 14 (43.8) | 13 (40.6) | 5 (15.6) |
| | Satisfied | 10 (71.4) | 4 (28.6) | 6 (42.9) | 3 (21.4) | 5 (35.7) |
| Eating restrictions | Dissatisfied | 6 (40) | 9 (60) | 5 (33.3) | 6 (40) | 4 (26.7) |
| | Relatively satisfied | 12 (42.9) | 16 (57.1) | 8 (28.6) | 14 (50) | 6 (21.4) |
| | Satisfied | 11 (61.1) | 7 (38.9) | 10 (55.6) | 4 (22.2) | 4 (22.2) |
| Tooth and jaw joint pain | Dissatisfied | 6 (28.6) | 15 (71.4) | 5 (23.8) | 11 (52.4) | 5 (23.8) |
| | Relatively satisfied | 12 (50) | 12 (50) | 12 (50) | 9 (37.5) | 3 (12.5) |
| | Satisfied | 11 (68.6) | 5 (31.4) | 6 (37.5) | 4 (25) | 6 (37.5) |
| Overall score | Dissatisfied | 9 (47.4) | 10 (52.6) | 5 (26.3) | 9 (47.4) | 5 (26.3) |
| | Relatively satisfied | 14 (40) | 21 (60) | 14 (40) | 15 (42.9) | 6 (17.1) |
| | Satisfied | 6 (85.7) | 1 (14.3) | 4 (57.1) | 0 (0) | 3 (42.9) |

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According to the calculation of chi-square, there was no statistically significant relationship between any of the dimensions of the questionnaire with gender and age. Only in the pain dimension, a chi-square of 5.97 was determined, in which there was a significant difference (P= 0.05). There was about a 40% difference between men and women in the two categories of satisfied and dissatisfied. In the satisfied group, men were 40% more than women, and conversely, in the dissatisfied group, women were 40% more than men.

To compare the mean DMFT in the five dimensions of the DIDL questionnaire, the mean DMFT was calculated for each dimension and compared through analysis of variance. The mean DMFT in the five dimensions of the questionnaire is shown in **Table 4**.

**Table 4.** Mean dental caries index (DMFT) and satisfaction level scores in oral health-related quality of life domains based on the DIDL (Dental Impact on Daily Lining) questionnaire

| Quality of life domain | Satisfaction rate by questionnaire dimensions | Number of people | Mean DMFT | F statistic | P-value |
|---|---|---|---|---|---|
| Appearance and aesthetics | Dissatisfied | 28 | 11.25 ± 5.27 | 4.134 | 0.021 |
| | Relatively satisfied | 18 | 8.33 ± 5.05 | | |
| | Satisfied | 15 | 7.07 ± 3.83 | | |
| Oral comfort | Dissatisfied | 15 | 11.27 ± 4.51 | 3.316 | 0.043 |
| | Relatively satisfied | 39 | 9.33 ± 5.19 | | |
| | Satisfied | 7 | 5.43 ± 4.35 | | |
| Overall oral and dental function | Dissatisfied | 15 | 10.40 ± 6.91 | 0.988 | 0.379 |
| | Relatively satisfied | 32 | 9.56 ± 4.10 | | |
| | Satisfied | 14 | 7.79 ± 5.16 | | |
| Eating restrictions | Dissatisfied | 15 | 11.07 ± 6.09 | 3.399 | 0.040 |
| | Relatively satisfied | 28 | 10.04 ± 4.37 | | |
| | Satisfied | 18 | 6.89 ± 4.76 | | |
| Tooth and jaw joint pain | Dissatisfied | 21 | 10.19 ± 4.01 | 0.409 | 0.666 |
| | Relatively satisfied | 24 | 8.92 ± 5.84 | | |
| | Satisfied | 16 | 8.94 ± 5.53 | | |
| Overall score | Dissatisfied | 19 | 11.42 ± 5.80 | 4.187 | 0.020 |
| | Relatively satisfied | 35 | 9.06 ± 4.48 | | |
| | Satisfied | 7 | 5.29 ± 4.07 | | |

Using a one-way analysis of variance, there was a significant difference in the mean DMFT between dissatisfied, relatively satisfied, and satisfied individuals in the dimensions of appearance and beauty, oral comfort, and eating restrictions; but no significant difference was found in the dimensions of general function and pain. The mean of all dimensions was lower in those who were satisfied with their quality of life than in relatively satisfied and dissatisfied individuals, respectively. In addition, the mean DMFT in dissatisfied, relatively satisfied, and satisfied individuals was significantly different from each other when considering the sum of the five dimensions.

According to the results of this study, a moderate, inverse, and significant relationship was found between DMFT and oral health-related quality of life. In other words, as the total caries index (sum of decayed teeth, filled teeth, and missing teeth) increases, the quality of life (satisfaction level) decreases. In the study of Khan *et al*. DMFT showed a significant relationship with oral health-related quality of life [21]. The results of the research also show a significant relationship between DMFT and the quality of life of specific patients such as diabetic patients, congestive heart failure and asthma [22], breast cancer [23], and rheumatoid arthritis [24], which in all these studies have recommended the need for these patients to pay attention to DMFT in terms of improving quality of life. Gomes *et al*. concluded that higher DMFT is associated with a greater impact on the daily functioning of individuals in social, physical, and psychological dimensions [25].

The study by Batista *et al*. showed that the loss of four or more teeth and caries requiring treatment

significantly affects quality of life [26]. In a study by Drachev *et al*. high DMFT was associated with poor quality of life [27]. A systematic review by Haag *et al*. of 21 studies with sample sizes ranging from 88 to 15,501 and using eight quality assessment tools showed a negative association between caries and tooth loss and quality of life [28]. In a study by Karasneh *et al*. using the DIDL questionnaire, satisfaction with the dental system had a significant effect on oral functions including chewing, speaking, comfort, general appearance, smiling, communication, and aesthetics [29].

In the present study, controlling for demographic variables such as gender, age, and education, there was an inverse and negative association between DMFT and quality of life. Gomes *et al*. also found that individuals with higher DMFT were 5.8 times more likely to experience significant effects on oral health-related quality of life than those with lower DMFT, controlling for age and education [25].

In the present study, using the correlation test, the relationship between DMFT and quality of life was moderate, inverse, and significant in men, and weak, inverse, and insignificant in women. In addition, using the multiple regression test, it was observed that the DMFT variable was significant and had an effect on the quality of life variable; but the gender variable was not significant, indicating that it did not affect the quality of life in the subjects studied. Batista *et al*. concluded that women reported a greater effect on quality of life, but no significant difference was observed between men and women [26]. Drachev *et al*. also stated that lower quality of life is observed more in older students and women. They also stated that DMFT and demographic factors such as gender could be powerful predictors of quality of life [27].

In interpreting the results obtained, it can be said that men are more affected by oral and dental problems than women, which may be due to more accurate reporting of quality of life status by men or poor self-reporting by women in the questionnaire and small sample size. However, the regression approach considers gender to be a significant predictor. To evaluate the quality of life (satisfaction level) in the five dimensions of the questionnaire by gender and age, the frequency of individuals in each of the groups was calculated and the nonparametric chi-square test was used for comparison. No statistically significant relationship was found between any of the dimensions of the questionnaire and gender and age. In other words, there was no statistically significant difference in the quality of life (satisfaction level) between men and women and between age groups. Only in the pain dimension, a chi-square of 5.97 was obtained, indicating that there was a statistically significant difference in this dimension. In the study by Batista *et al*. pain had the greatest effect on the quality of life and was the main factor in visiting the dentist [26].

## Conclusion

The findings of this study showed that an increase in the dental caries index reduces the quality of life related to oral health. In addition, each of the components of DMFT can independently affect the quality of life of an individual. Appearance and beauty, feeling of oral comfort, and eating restrictions are among the important factors that affect the quality of life and life satisfaction. Therefore, the importance of using effective preventive and therapeutic methods to improve dental health and increase the quality of life of patients was well established.

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